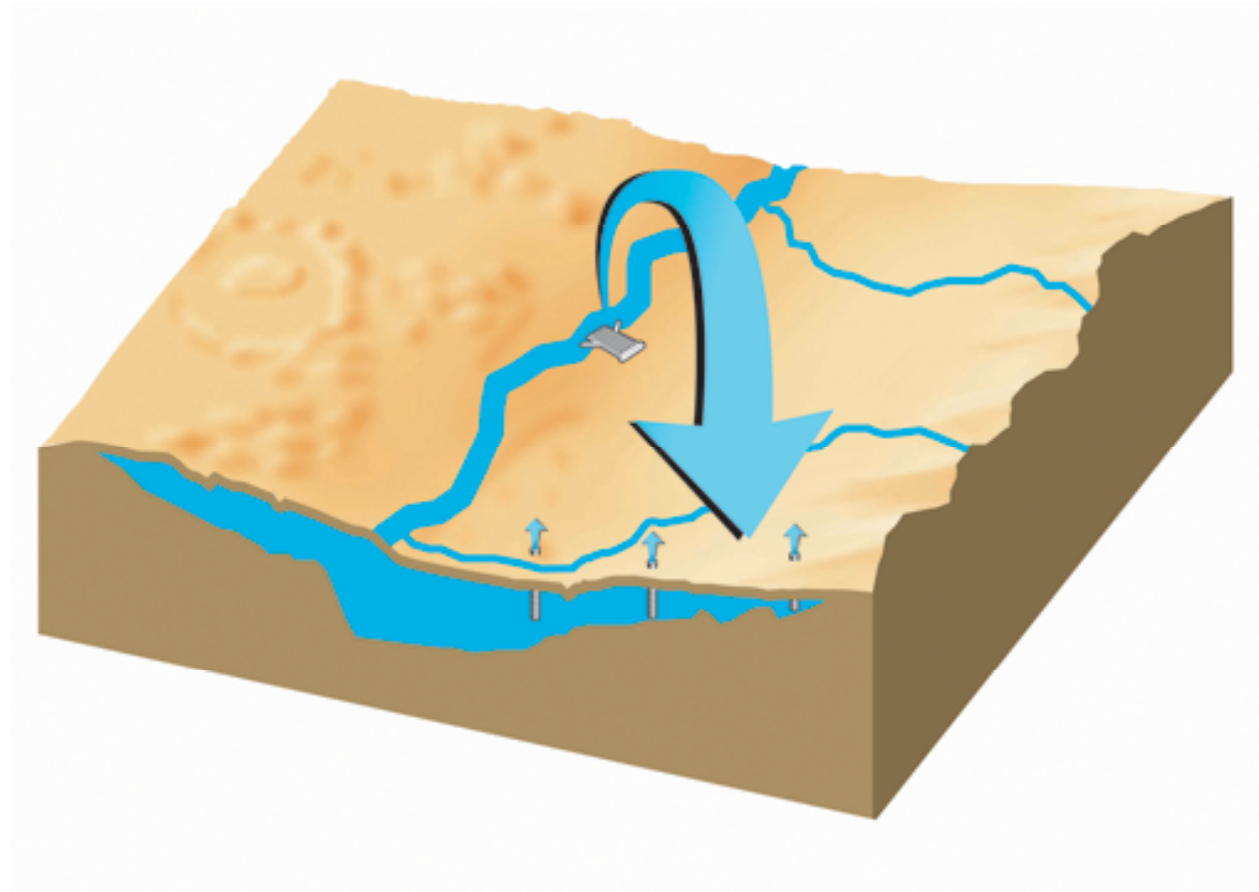


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SANTA FE COUNTY CONJUNCTIVE MANAGEMENT PLAN FOR THE SANTA FE BASIN



March 19, 2008

**Prepared by
Santa Fe County Attorney's Office and
Growth Management Dept: Water / Wastewater Operations**

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I. PURPOSE

The purpose of this Conjunctive Management Plan for the Santa Fe Basin (“the Plan”) is to set forth principles and planning objectives to guide the management of the County's water resources supplied from multiple sources. In addition, this document is intended to provide information to support the County's growth management strategy, and to guide similar planning efforts. The County's growth management efforts are focused on sustainable growth consistent with resources such as roads, utilities, water, access to education, police and fire services, and other important attributes of a civilized society.

II. OVERVIEW

The County is in the process of acquiring and diversifying its sources of water supply. Because the ground and surface waters available from the Santa Fe Basin are not sufficient to meet long-term demands, the County, along with its partners, the City of Santa Fe and Las Campanas, has embarked on a major surface diversion project on the Rio Grande known as the Buckman Direct Diversion (BDD) Project. Instead of relying solely on local water resources to supply residents of the Santa Fe Basin, the use of San Juan-Chama Project water and native Rio Grande water from the BDD will protect water resources within the Santa Fe Basin.

Once the BDD becomes operational, the County will be able to deliver up to 2,200 acre-feet per year (afy) (1,700 afy directly from BDD and 500 afy from the City of Santa Fe through a wholesale water agreement). This water will be available for distribution to County customers. Although water from the BDD will provide additional supplies from a historically reliable source (the Rio Grande) and will lessen the demand on local supplies, this Plan recognizes that surface flows on the Rio Grande can be variable. Therefore, the County has identified potential facilities, mechanisms and sources of supply that may be used in conjunction with the County's primary source of supply from the BDD, as described in this Plan.

This Plan is intended to cover the period from commencement of operations of the BDD until the County portion of the project reaches its maximum capacity of 1,700 afy, which is expected in about 20 years. The County recognizes that it will need to develop other sources of supply in the future not described in this Plan in order to meet demands in the long-term.

Implementation of this Plan is intended to provide the following major benefits to the Santa Fe Basin:

- **Protection of Local Water Resources:** By using surface water from the Rio Grande as the primary source of supply, use of local ground water resources will be minimized and water in the local aquifer will be preserved.
- **Reliability of Supply:** By establishing a back-up groundwater supply, water supplied by the County water utility will be made reliable even during those times when Rio Grande surface supplies may be inadequate, because of drought or other conditions affecting river flow, including the potential impact of climate change.

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- Acequia Preservation: This plan also affirms the County policy of protection of acequia water rights.
- Optimization of Public Assets: By proposing a multi-year rolling average for groundwater use, this Plan will dramatically reduce the number of local groundwater rights needed by the County and will optimize the rights already controlled by the County.
- Benefits to Other Water Rights Holders: By shifting the predominant source of supply from local groundwater to Rio Grande surface supplies, depletions effects on area springs and surface water tributaries will be reduced.
- Environmental Benefits: In addition reducing depletions to springs and tributaries, this Plan contains a specific proposal to increase flows in the Santa Fe River.
- Regional Coordination: A critical foundation of this plan is regional cooperation and coordination with other stakeholders, including acequia associations, the City of Santa Fe and the Pueblos of Nambe, Pojoaque, San Ildefonso and Tesuque.

III. SURFACE SUPPLY FROM THE RIO GRANDE

A. The Buckman Direct Diversion (BDD) Project.

The BDD project is the major ongoing initiative to bring a new and substantial source of supply to the Santa Fe Basin. To be located on the east side of the Rio Grande three miles south of the Otowi Gage, the project will divert surface flows of the Rio Grande, provide treatment, and provide potable water for distribution and use by the City and the County. Las Campanas will receive raw, untreated water from the project. Slated to be completed and commence operations in 2011, the BDD will be authorized to divert 8,730 afy, allocated among the project's three partners

Table 1: Allocation of BDD Annual Diversion Capacity

PARTICIPANTS	ALLOCATION OF CAPACITY (AFY)
Santa Fe County	1,700
City of Santa Fe	5,230
Las Campanas	1,800
Total	8,730

B. Purpose and Need for the Project.

On February 11, 2008, the U.S. Forest Service and the Bureau of Land Management authorized issuance of the Record of Decision approving the BDD as proposed in the Final Environmental Impact Statement dated September 2006 (BDD EIS). The BDD EIS describes the purpose and need for the project as follows:

As demonstrated by drought conditions in 1996, 2000, and 2002, continuing water shortages in the City and County resulted in a critical and immediate need for water. To meet this need, the applicants are seeking sustainable means of accessing surface water supplies that would use the applicants' water rights by diverting San Juan-Chama Project water and native Rio Grande water while reducing their reliance on over-taxed ground water resources.

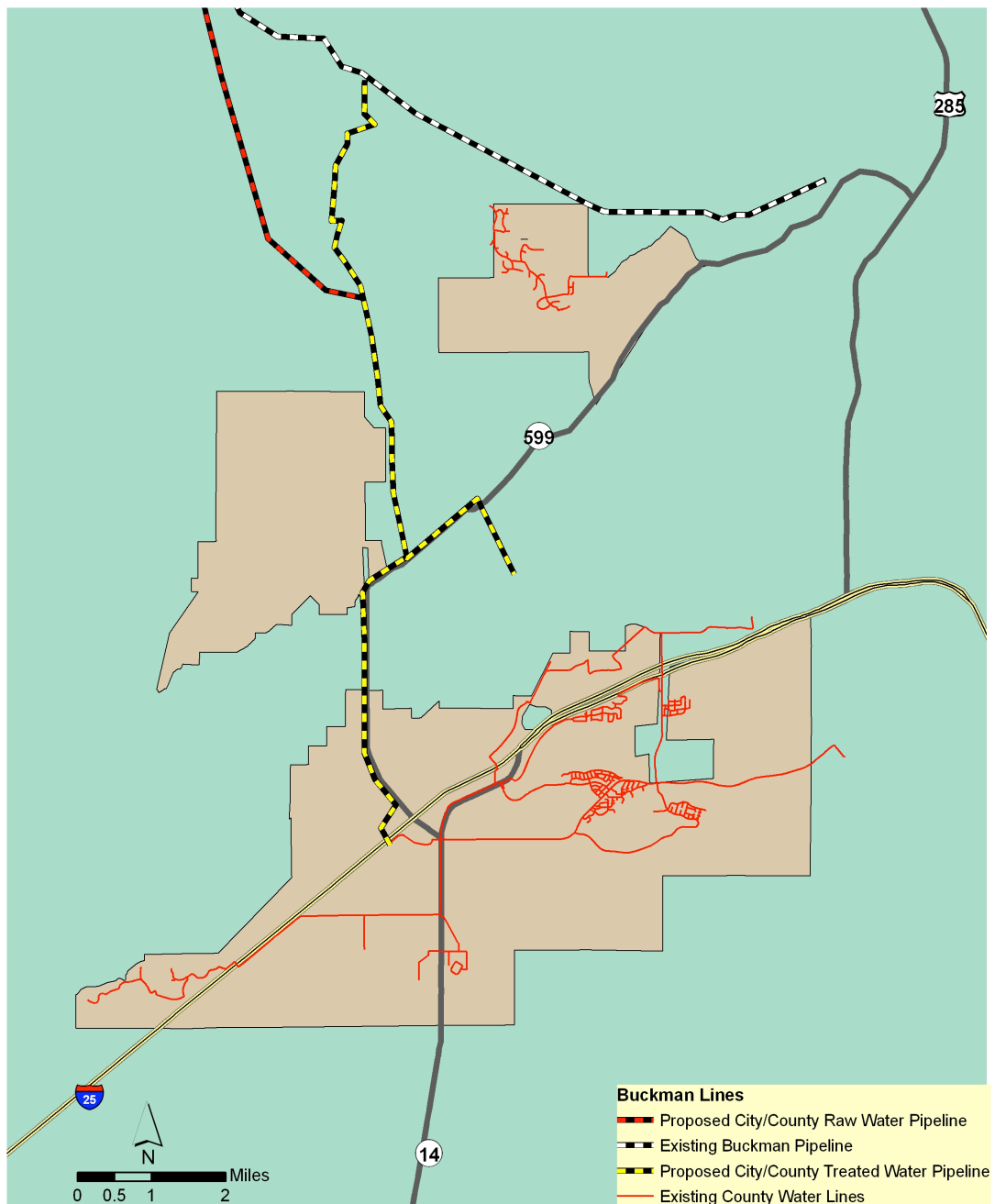
The Buckman Well Field, a group of ground water wells located near the river in the vicinity of the Buckman site, is currently being used to access existing water rights in order to provide water to the City and County water service areas and Las Campanas. However, the well field cannot provide a reliable and sustainable source of water. Well yields have been reduced; hydraulic heads in the confined ground water aquifer near the well field have undergone substantial declines; and depletions of nearby streams could cause limitations to pumping. At current well production levels, undesirable consequences to ground water levels and continued depletion of nearby streams are expected to occur unless an alternate reliable water supply is found. (BDD EIS, pages 1 & 17).

As described in the EIS, the no-action alternative would mean the project would not be built and, instead, the project participants would continue to rely on the limited resources of the Santa Fe Basin. However surface water is not available for new uses and local groundwater levels are in decline. Below the City of Santa Fe reservoirs in the Santa Fe Canyon, flow in the Santa Fe River is intermittent, only occurring when reservoirs are full because of high snow pack or rainfall or after storm events. The vast majority of the time, the river bed is dry.

Drawdown effects and subsidence caused by pumping of the City of Santa Fe's Buckman Well Field have revealed the limited capacity of the aquifer to provide a long-term source of supply. Although the Buckman Well Field is permitted for diversion of 10,000 afy, the safe yield is considered to be well below that amount. In conjunction with the operations of the BDD, the City of Santa Fe has projected that its average annual diversion from the Buckman Well Field will drop to 1,000 to 2,000 acre-feet.

Figure 1: Map of Existing and Proposed BDD Lines

Santa Fe County Utility Service Area



Although growth in the unincorporated County within the Santa Fe Basin can be managed, it is predicted that population increases will also mean more residences and more demand for water. Residents not served by the County water utility are reliant almost exclusively on domestic wells. With growth in population in the unincorporated County over time, the number of domestic wells drawing from the local aquifer has increased. Under New Mexico law, transfer of a water right is not required to obtain a domestic well permit.

These domestic wells place additional stress on the aquifer; eventually, this stress may lead to diminished surface flows and spring volumes. Residents of the La Cienega area have already expressed concerns about the effects of pumping on spring flows from the La Cienega springs.

Consistent with this Plan, supply of water from the BDD will allow the County to provide an alternative supply to existing domestic groundwater demand and substitute an imported supply for new demands that otherwise would seek domestic or other groundwater supply from the local aquifer.

Although the use of surface water from the BDD should greatly relieve demand on local water resources, the County recognizes that it cannot solely rely on BDD supplies and that it will be necessary, as discussed below in Section IV, to permit and construct an in-basin County well field to provide supplemental and backup supply.

C. Categories of Surface Water Supply from the Rio Grande.

Santa Fe County will have two distinct types of water supply available from the Rio Grande for diversion by the BDD. The following table shows the quantity of supply by category both of native rights and San Juan-Chama Project diversion rights for the County and its two BDD partners.

Table 2: Categories of Water Rights for Diversion at the BDD

BDD PARTNER	NATIVE RIGHTS (AFY)	SAN JUAN-CHAMA PROJECT WATER PERMIT(AFY)	SAN JUAN-CHAMA PROJECT WATER DIVERSION AMOUNT
Santa Fe County	1,325	375	367.5
City of Santa Fe	-0-	5,230	5,125.4
Las Campanas	1,800	1,200*	1,200*

*Temporarily Leased from the City of Albuquerque; expiring in 2016

In order to make its Rio Grande surface water supplies as reliable as possible, the County will manage its native and San Juan-Chama water to maximize the availability of each source of supply in combination with the other.

1. San Juan-Chama Project Water.

In 2006, Santa Fe County signed a permanent contract with the U.S. Bureau of Reclamation for 367.5 afy of water from the San Juan-Chama Project. That project diverts water from the San Juan stream system within the State of New Mexico's apportionment of the Colorado River. Under a 1955 State Engineer permit, the Bureau of Reclamation diverts water from the Blanco, Navajo and Little Navajo streams and transmits that water through tunnels across the Continental Divide to the Upper Rio Chama stream system and into storage at Heron Reservoir. The Bureau of Reclamation has contracted for an annual release to project beneficiaries of 96,200 afy based on the project's firm yield. All of the San Juan-Chama Project water is either under contract or otherwise allocated.

The County's San Juan-Chama Project water along with its native rights allow for a more diversified portfolio of supply from the Rio Grande. Because of the Bureau of Reclamation's storage facilities at Heron Reservoir, San Juan-Chama water is relatively reliable. In addition, under Section 205 of the Energy and Water Development Appropriations Act, 2005 (118 Stat. 2949), San Juan-Chama Project water is insulated from flow demands required for the endangered Rio Grande silvery minnow. San Juan-Chama Project water is also immune from priority administration on the Rio Grande.

The 367.5 afy of San Juan-Chama Project water owned by the County represents only about a quarter of the supplies available for the County's portion of BDD. If possible, the County should seek to obtain additional San Juan-Chama Project water either through permanent contract or through lease.

In 2005, the City of Santa Fe entered into a 50-year lease with the Jicarilla Apache Nation for 3,000 afy of San Juan-Chama Project water. Additional San Juan-Chama Project water may be available for lease. However, in considering whether it is appropriate to lease water, the County must consider (1) whether the lease price is economical in comparison to water right purchases; (2) what assurances may be built into a lease to facilitate lease renewal if desired by the County; (3) what portion of the County's total supply should be leased water in the event a lease is not renewed; and (4) whether the State Engineer will issue a permit approving use of leased water.

As a matter of good water planning, a water utility should not commit to provide permanent service to uses based upon a temporary (leased) water supply. Nonetheless, because within every water utility service area some uses require a permanent supply and others do not, it may make sense for some fraction of a water utility's total expected water demand budget to be supplied from leased water. Given the ratio of residential uses to other uses such as recreational and commercial expected over time within the Santa Fe County service area, this Plan adopts an upper limit of 10% of the total water supply available to the County that could be considered for lease. If for example at an unspecified point in the future, the total County water demand is projected to be 3,000 afy, no more than 300 afy should be derived from a leased water supply.

2. Native Rio Grande Rights.

If the County does not lease or acquire any additional San Juan-Chama Project water, then its current contract of 367.5 afy will be the maximum amount of San Juan-Chama Project water available from the BDD. As a result, over time the County will need to acquire and transfer

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1,332.5 afy of native rights for use from the BDD. Over the last several years, the County has acquired and transferred 476.7 afy to the Buckman Well Field. Another 55 afy is pending transfer to the Buckman Well Field.

Now that the State Engineer has issued the BDD permit, the County will transfer the rights permitted in the Buckman Well Field to the BDD. In addition, the County is continuing to transfer native rights directly to the BDD in the amount of 726.5 afy. Additional waters that potentially could be transferred into the County wells will instead are transferred to the BDD if the State Engineer approves multi-year averaging of pumping from the County wells as proposed in Section IV (B), below.

Table 3: Santa Fe County Rio Grande Native Rights

STATUS	QUANTITY (AFY)
Ready for Transfer to the BDD	476.7
Pending Application for Permit for Offset of Buckman Wells	55.0
Pending Applications for Permit to BDD	726.5
Available for Transfer to BDD	67.0
TOTAL	1,325.2

A detailed description of the water rights summarized in Table 3 is provided in Appendix A. Although the above total is close to the 1,332.5 afy needed, the County assumes that not all of the amounts applied for will be granted. For planning purposes, the County assumes another 100 to 200 afy of water rights will be acquired and transferred to the BDD to reach the County's full capacity of 1,700 afy including the 367.5 afy of San Juan-Chama Project water. Once 1,700 afy is transferred to the BDD, the County expects to continue acquiring and transferring additional water rights in order to meet projected 40-year water supply needs.

In January of 2006, the State Engineer instituted a new policy prohibiting transfers of pre-basin (1956) and post-compact (1938) groundwater rights for use as offsets of surface depletions caused by groundwater pumping of post-basin wells within the Middle Rio Grande. This policy reflects concern by the State Engineer that water users should not become reliant on junior groundwater rights to assure that their groundwater pumping effects on surface flows are in priority.

This issue raises the question whether the County's native water right supplies are sufficiently senior in priority to assure reliability. Of the water rights identified in Table 4 above, 55 acre feet are pre-basin, post-compact groundwater rights and 1,270.2 acre feet are more senior pre-1907 surface water rights.

Table 4: Breakdown of County BDD Native Water Rights by Category and Priority Date

TYPE OF RIGHT	QUANTITY (AFY)	PERCENTAGE OF TOTAL	PRIORITY
Groundwater	55.0	4.2 %	Pre-1956, Post-1938
Surface Water Rights	1,270.2	95.8 %	Pre-1907

More than ninety-five percent of the County's native Rio Grande rights have senior priority, pre-1907 surface water rights and should assure high security in the availability of supply under those rights. In evaluating water rights for acquisition in the future, the County should seek to acquire senior water rights. However such acquisition must conform to the County's long standing policy of protection of acequia rights.

D. Curtailment of BDD Operations

Operations of the BDD are subject to a staged curtailment plan approved by the U.S. Fish and Wildlife Service. See the Biological Opinion dated June 25, 2007, pages 11-13. During the irrigation season (March through October), the curtailment plan requires reduction of diversions of native Rio Grande water at the BDD during low-flow conditions. The curtailment plan is designed to minimize the potential effects of BDD diversions to the endangered Rio Grande silvery minnow during the period of highest water use in the Middle Rio Grande typically occurring in warmer months after spring runoff.

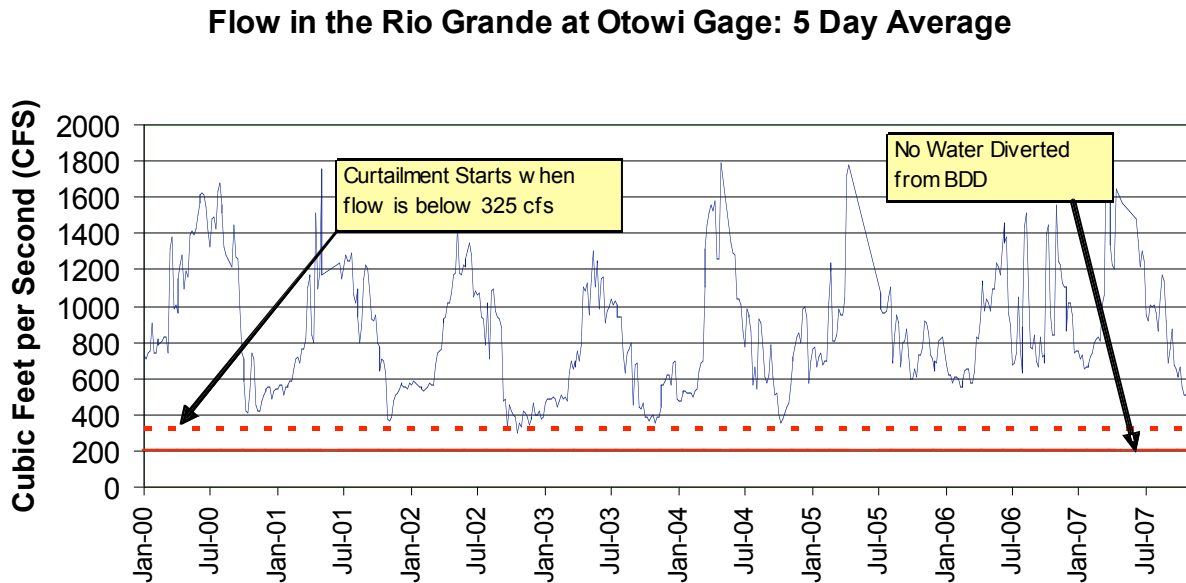
Curtailment will be based on a 5-day running average measurement of native flows (those flows except for San Juan-Chama Project water released for municipal and industrial consumptive use) when the Otowi Gage shows a flow at or below 325 cubic feet per second (cfs). When this threshold is passed, the plan calls for diversions of native Rio Grande water to decrease according to the schedule shown in Table 5.

Table 5: Curtailment Schedule for BDD when Otowi Gage Native Flows are below 325 cfs.

Month:	BDD Diversions (CFS)							
	March	April	May	June	July	Aug	Sept	Oct
Native Flow in cfs								
325 cfs and above (no reduction)	3.82	4.6	6.87	8.55	7.95	7.56	6.57	5.09
300	3.05	3.68	5.50	6.84	6.36	6.05	5.26	4.07
280	2.44	2.95	4.40	5.47	5.09	4.84	4.21	3.26
260	1.83	2.21	3.30	4.10	3.82	3.63	3.16	2.44
240	1.22	1.47	2.20	2.73	2.54	3.42	2.10	1.63
220	0.61	0.74	1.10	1.37	1.27	1.21	1.05	0.81
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

For example, if a 5-day average of native flows in June dropped to 260 cfs at Otowi, BDD diversions of native water would be reduced to 4.1 cfs.

The curtailment plan demonstrates in very concrete terms that supply to County utility customers could be cutoff in the absence of backup sources that can be managed conjunctively with BDD supply. Figure 2 shows the 5 day average for flow on the Rio Grande at Otowi Gage. In 2002 the flow on the Rio Grande was low enough to start curtailment though only for a few days.

Figure 2: USGS Otowi Gage Data

E. Potential Effects of Climate Change.

There is uncertainty regarding climatic changes induced by natural and anthropogenic processes. Global climate change may affect water resources negatively, and particularly vulnerable semi-arid climates like that found in New Mexico. Global climate change can impact hydrological extremes such as floods and droughts, influencing all their parameters – severity, frequency, and intensity.¹

Santa Fe County is particularly susceptible to climatic change. In the Santa Fe Basin, mountain front recharge from melting snow pack is the primary source of water for the aquifer and the City's reservoirs. These sources constitute the County's principal water supply. After the BDD becomes operational, the Rio Grande will become an important additional source of water. It too may be susceptible to droughts or floods if climatic trends are negative.

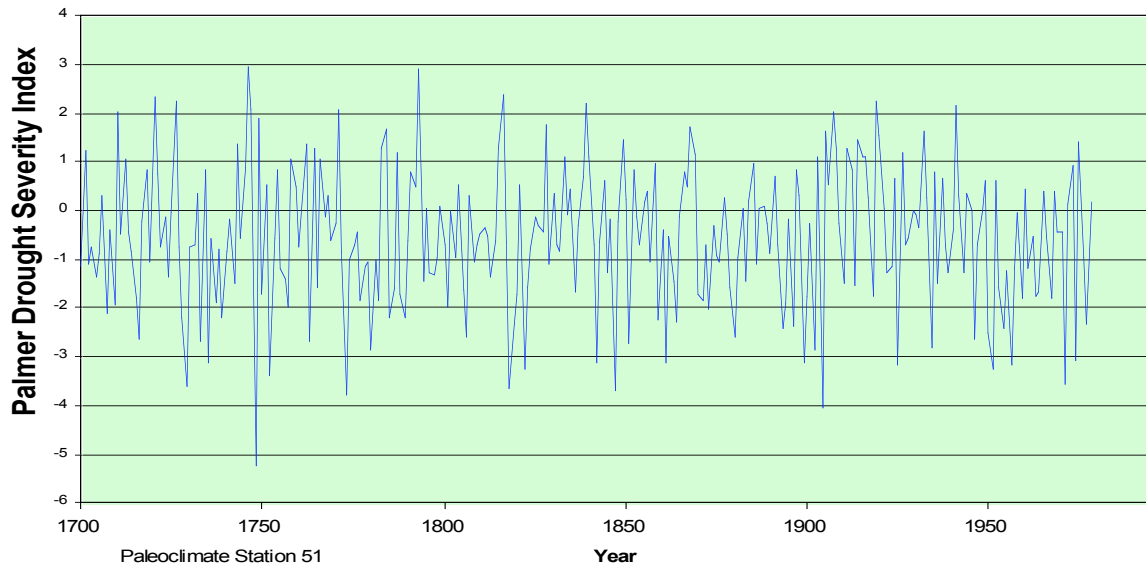
The long term effects of climatic change on our community are uncertain. Some research points towards a wetter and hotter New Mexico; other research reaches different results. However, one only needs to consult the long term climatic record in New Mexico to realize that the potential for severe climatic change exists. Tree ring data discloses a troubling climatic past in New Mexico. Even if research cannot with certainty pinpoint the effects of climatic change on New

¹ Z. W. KUNDZEWICZ and L. SOMLY O' DY, *Water Resources Management* **11**: 407–435, 1997.

Mexico, the historic record shows that non-anthropogenic climatic change has already produced serious consequences on our region in the past.

This region regularly undergoes wet and dry cycles. Figure 3 is a measurement of the relative drought severity in the Santa Fe region over 300 years. The 2,000 year record shows that severe dry cycles occur with regularity. The consequences of dry cycles of the magnitude seen in the historical record are sobering.

Figure 3: Tree Ring Data- Relative Drought Severity in the Santa Fe Area



Since the County, through the BDD, will be relying on the Rio Grande as its primary water source (with the Santa Fe Basin serving as a secondary or back up source), it is important to understand how the trends seen in the climatic record might affect this source. The climatic record can be used as a tool to understand the frequency, duration and severity of droughts, and therefore the flows of the Rio Grande during dry cycles. The operating rules of the BDD will require that deliveries from that source begin curtailment when flows in the Rio Grande are below 325 cubic feet per second. All deliveries cease when flows are below 200 cfs. The challenge is determining how the droughts regularly experienced in New Mexico in the past will affect river flows in the future.

To estimate how reductions in flows may affect the County, County staff applied reductions to normal flows to examine different scenarios. In Figure 4, flows were reduced by 25%. In Figure 5, flows were reduced by 50%. These reduced supply scenarios illustrate how drought might produce periods when deliveries from the BDD will be curtailed, and other sources utilized.

Figure 4: Hypothetical 25 % Reduction of flow on the Rio Grande

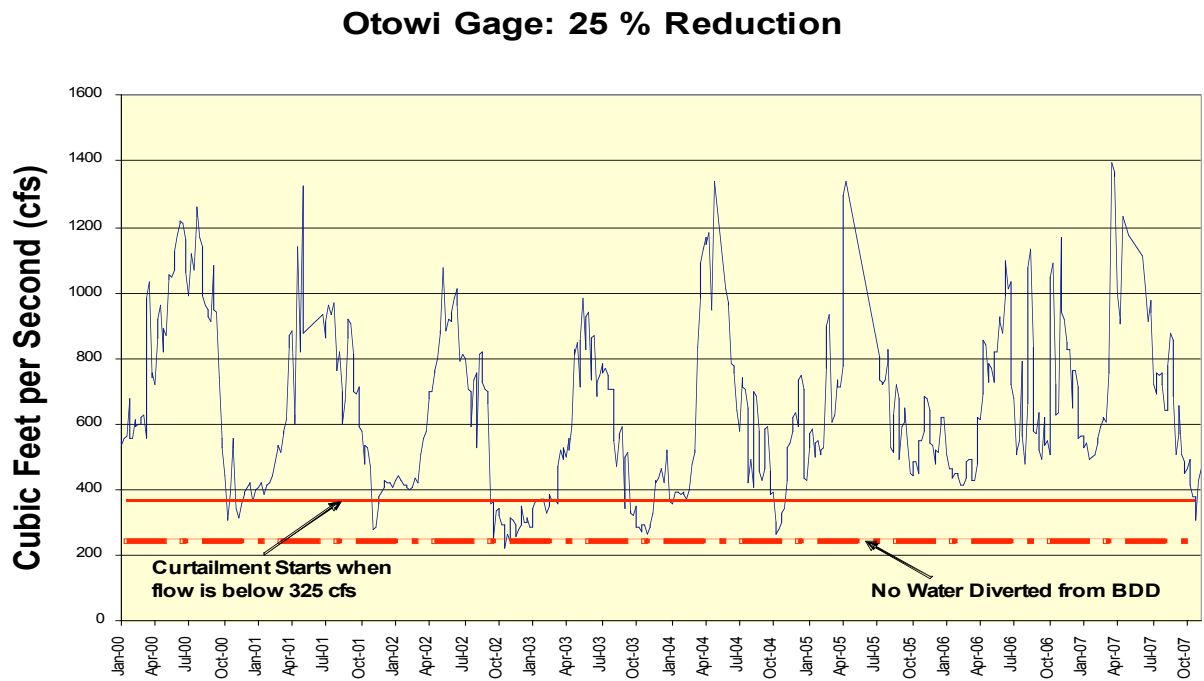
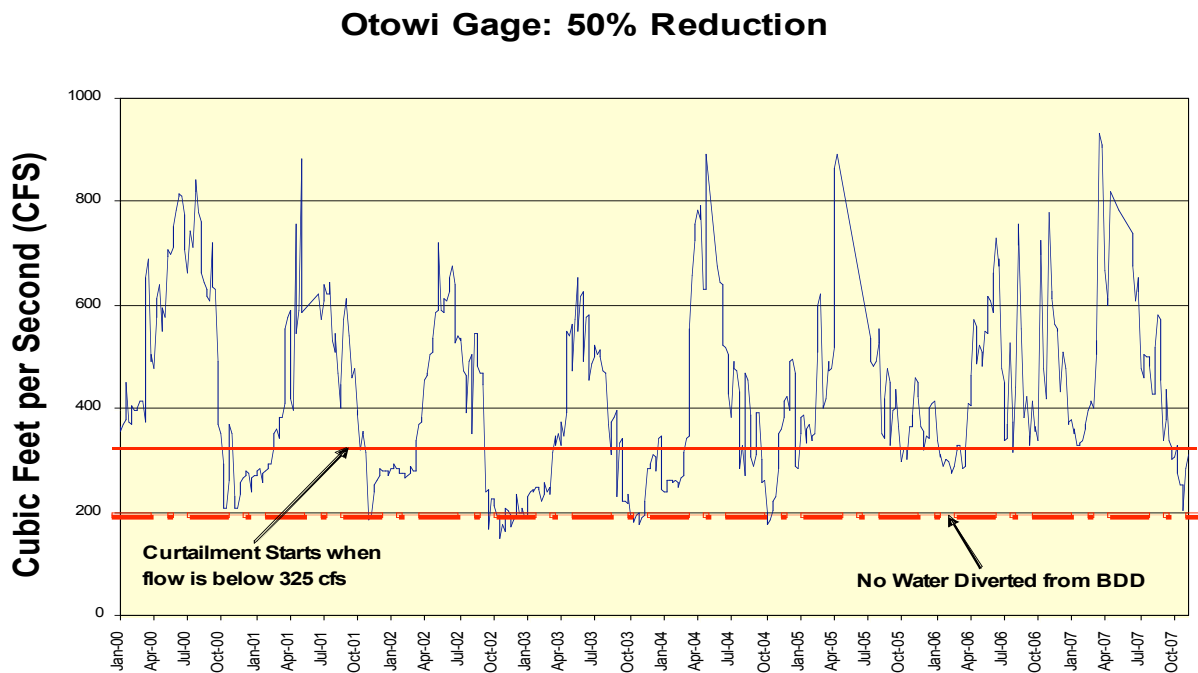


Figure 5: Hypothetical 50% Reduction of flow in the Rio Grande



F. Storage at Abiquiu Reservoir.

In order to provide further certainty and flexibility of its Rio Grande water supplies, both native and San Juan-Chama, the County is in the process of securing a storage contract in Abiquiu Reservoir. The most likely use of storage capacity in Abiquiu Reservoir would be for the County's 367.5 afy of San Juan-Chama Project water. Every year, San Juan-Chama contractors must either accept release of their San Juan-Chama allocation or the waters revert back to the common pool in Heron Reservoir. Having its own separate storage in Abiquiu Reservoir would allow the County to take delivery of its project water and place it in storage for use when needed.

IV. CONJUNCTIVE AQUIFER MANAGEMENT

A. Need for Groundwater Backup Supply

Santa Fe County recognizes the importance of conjunctively managing surface and groundwater resources in order to provide a long-term and reliable supply. Essential to the County's Plan is use of available surface water supplies, namely from the Rio Grande (the primary source of supply), and groundwater (a backup or supplemental supply). Under this plan, groundwater is backup supply, much like a water savings account or reserve.

Once the BDD becomes operational, the County will have 2,200 afy of available supply from the Rio Grande (1,700 afy from the BDD and 500 afy of wholesale water from the City of Santa Fe, as described in Section V(C) below).

One essential planning issue that must be addressed is whether in times of BDD shortage groundwater supplies should be expected to provide 100% backup for all County deliveries or some fraction thereof. The County believes that in times of shortage, conservation and water use restrictions should be used to reduce consumption to the extent feasible. However, demand on the County system is not particularly responsive to conservation and water use restrictions since most developments in the County are fairly new and tight water use budget requirements and conservation measures have been required by the Land Development Code. As a result, this Plan proposes an alternative or backup supply of 90% of the total annual maximum available from the BDD or 1,530 afy (90% of 1,700 afy¹). Not all of that amount, however, must be sourced from County wells. Under the 2005 Water Resources Agreement with the City of Santa Fe, the City agrees to provide up to 50% backup supply or 850 afy. Section 7 of the Agreement provides in part:

¹ Because the 500 afy of wholesale water from the City is derived from the multiple sources of supply available to the City (including surface water from the reservoirs and groundwater from the City's wells), this Plan does not propose a groundwater backup supply for that source. This Plan only proposes a groundwater backup supply for the 1,700 afy of surface water to be derived from the BDD.